

Claims

1. A bar code scanner comprising light source means (15) and light detector means (16), characterised by a light transmissive slit (19) arranged for being
5 brought into proximity with a bar code (32) for scanning thereof, the light source means (15) being configured for directing a beam through said slit (19) and the light detector means (16) being configured for detecting light from said beam reflected back through the slit (19).
- 10 2. A bar code scanner according to claim 1, wherein the light source means (15) is configured for directing said beam through the slit (19) such that the beam path through the slit (19) lies in a plane substantially aligned with the slit (19).
3. A bar code scanner according to claim 2, where in the light source means
15 (15) is configured to direct light obliquely through the slit (19).
4. A bar code scanner according to claim 1, 2 or 3, wherein the light detector means (16) is configured for sensing reflections of said beam following a path through the slit (19) that lies in a plane substantially aligned with the slit (19).
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5. A bar code scanner according to claim 4, wherein the light detector means (16) is directional and arranged such that it is directed along a line substantially normal to the slit (19).
- 25 6. A bar code scanner according to any preceding claim, wherein the slit (19) is formed in a metallic element (18).
7. A bar code scanner according to claim 6, wherein the metallic element (18) is formed from a stainless steel.
- 30 8. A bar code scanner according to any preceding claim, including a panel (21) by which a sheet (31) can be passed, the panel (21) having an aperture through which the slit (19) is exposed.

9. A bar code scanner according to claim 8, including a member (17) having a dished portion, wherein the slit (19) is formed in an opaque element (18) which is accommodated in said dished portion and the dished portion is received in said aperture.
10. A bar code scanner according to any preceding claim, wherein the width of the slit (19) is in the range 0.2mm to 0.4mm.
11. A bar code scanner according to claim 10, wherein the width of the slit (19) is 0.3mm.
12. A bar code scanner according to any preceding claim, wherein the separation of the openings of the slit (19) is in the range 0.05 to 0.1 mm.
13. A bar code scanner according to claim 12, wherein the separation of the openings of the slit (19) is 0.075mm.
14. A sheet validator including a sheet path (6) along which a sheet (31) to be validated is passed and a bar code scanner (12), according to any preceding claim, located for scanning a bar code (32) on a sheet (31) passing along the sheet path (6).
15. A method of manufacturing a bar code scanner comprising forming a light transmissive slit (19) and mounting the slit with respect to a light source means (15) and a light detector means (16), such light from the light source means (15) can pass through the slit (19) and light from the light source means (15) that is reflected back through the slit (19) can be detected by the light detector means (16).
16. A method according to claim 15, wherein the slit (19) is formed by chemically etching a thin metallic element (18).

17. A method of manufacturing a sheet validator including a bar code scanner (12), the method including a method according to claim 15 or 16 for manufacturing said bar code scanner (12).

5 18. A bar code scanner comprising:
a light transmissive slit,
light source means for directing a beam through said slit, and
light detector means for detecting light from said beam reflected back
through the slit,
10 wherein the slit is arranged for being brought into proximity to a bar code
for scanning thereof.

19. A bar code scanner according to claim 18, wherein the light source means is
configured for directing said beam through the slit such that the beam path through
15 the slit lies in a plane substantially aligned with the slit.

20. A bar code scanner according to claim 19, where in the light source means is
configured to direct light obliquely through the slit.

20 21. A bar code scanner according to claim 18, wherein the light detector means
is configured for sensing reflections of said beam following a path through the slit
that lies in a plane substantially aligned with the slit.

22. A bar code scanner according to claim 21, wherein the light detector means
25 is directional and arranged such that it is directed along a line substantially normal
to the slit.

23. A bar code scanner according to claim 18, wherein the slit is formed in a
metallic element.

30 24. A bar code scanner according to claim 23, wherein the metallic element is
formed from a stainless steel.

25. A bar code scanner according to claim 18, including a panel by which a sheet can be passed, the panel having an aperture through which the slit is exposed.

26. A bar code scanner according to claim 25, including a member having a
5 dished portion, wherein the slit is formed in an opaque element which is
 accommodated in said dished portion and the dished portion is received in said
 aperture.

27. A bar code scanner according to claim 18, wherein the width of the slit is in
10 the range 0.2mm to 0.4mm.

28. A bar code scanner according to claim 27, wherein the width of the slit is
 0.3mm.

29. A bar code scanner according to claim 18, wherein the separation of the
15 openings of the slit is in the range 0.05 to 0.1 mm.

30. A bar code scanner according to claim 29, wherein the separation of the
 openings of the slit is 0.075mm.

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31. A bar code scanner comprising:
 a member having a slit,
 a light source means for directing light obliquely through said slit in a plane
 normal to and aligned with said slit, and

25 a light detector means for receiving light passing through the slit along a
 path normal thereto,

 wherein the light source means and the light detector means are on the same
 side of said member.

32. A sheet validator including a sheet path along which a sheet to be validated
30 is passed and a bar code scanner comprising:

 a light transmissive slit,

 light source means for directing a beam through said slit, and

light detector means for detecting light from said beam reflected back through the slit,

wherein the slit is arranged for being brought into proximity to a bar code for scanning thereof.

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33. A sheet validator according to claim 32, wherein the light source means is configured for directing said beam through the slit such that the beam path through the slit lies in a plane substantially aligned with the slit.

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34. A sheet validator according to claim 33, where in the light source means is configured to direct light obliquely through the slit.

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35. A sheet validator according to claim 32, wherein the light detector means is configured for sensing reflections of said beam following a path through the slit that lies in a plane substantially aligned with the slit.

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36. A sheet validator according to claim 35, wherein the light detector means is directional and arranged such that it is directed along a line substantially normal to the slit.

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37. A sheet validator according to claim 32, wherein the slit is formed in a metallic element.

38. A sheet validator according to claim 37, wherein the metallic element is formed from a stainless steel.

39. A sheet validator according claim 32, including a panel by which a sheet can be passed, the panel having an aperture through which the slit is exposed.

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40. A sheet validator according to claim 39, including a member having a dished portion, wherein the slit is formed in an opaque element which is accommodated in said dished portion and the dished portion is received in said aperture.

41. A sheet validator according to claim 32, wherein the width of the slit is in the range 0.2mm to 0.4mm.

42. A sheet validator according to claim 41, wherein the width of the slit is
5 0.3mm.

43. A sheet validator according to claim 32, wherein the separation of the openings of the slit is in the range 0.05 to 0.1 mm.

10 44. A sheet validator according to claim 43, wherein the separation of the openings of the slit is 0.075mm.

45. A sheet validator including a sheet path along which a sheet to be validated is passed and a bar code scanner comprising:

15 a member having a slit,

a light source means for directing light obliquely through said slit in a plane normal to and aligned with said slit, and

a light detector means for receiving light passing through the slit along a path normal thereto,

20 wherein the light source means and the light detector means are on the same side of said member.

46. A method of manufacturing a bar code scanner comprising forming a light transmissive a slit and mounting the slit with respect to a light source means and a
25 light detector means, such light from the light source can pass through the slit and light from the light source that is reflected back through the slit can be detected by the light detector means.

47. A method according to claim 46, wherein the slit is formed by chemically
30 etching a thin metallic element.

48. A method of manufacturing a sheet validator including a bar code scanner, the method including a method according to claim 46 for manufacturing said bar code scanner.
- 5 49. A method of manufacturing a sheet validator including a bar code scanner, the method including a method according to claim 47 for manufacturing said bar code scanner.

AMENDED CLAIMS

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Claims

1. A bar code scanner comprising light source means (15), light detector means (16) and an elongate light transmissive opening (19) arranged for being brought into
5 proximity with a bar code (32) for scanning thereof, the light source means (15) being configured for directing a beam through said opening (19) and the light detector means (16) being configured for detecting light from said beam reflected back through the opening (19), **characterised in that** said opening (19) comprises a slit (19) formed in a metallic element (18).
- 10 2. A bar code scanner according to claim 1, wherein the light source means (15) is configured for directing said beam through the slit (19) such that the beam path through the slit (19) lies in a plane substantially aligned with the slit (19).
- 15 3. A bar code scanner according to claim 2, where in the light source means (15) is configured to direct light obliquely through the slit (19).
4. A bar code scanner according to claim 1, 2 or 3, wherein the light detector means (16) is configured for sensing reflections of said beam following a path
20 through the slit (19) that lies in a plane substantially aligned with the slit (19).
5. A bar code scanner according to claim 4, wherein the light detector means (16) is directional and arranged such that it is directed along a line substantially normal to the slit (19).
- 25 6. A bar code scanner according to any preceding claim, wherein the light source is an infrared LED (15).
7. A bar code scanner according to any preceding claim, wherein the metallic
30 element (18) is formed from a stainless steel.

8. A bar code scanner according to any preceding claim, including a panel (21) by which a sheet (31) can be passed, the panel (21) having an aperture through which the slit (19) is exposed.

5 9. A bar code scanner according to claim 8, including a member (17) having a dished portion, wherein the slit (19) is formed in an opaque element (18) which is accommodated in said dished portion and the dished portion is received in said aperture.

10 10. A bar code scanner according to any preceding claim, wherein the width of the slit (19) is in the range 0.2mm to 0.4mm.

11. A bar code scanner according to claim 10, wherein the width of the slit (19) is 0.3mm.

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12. A bar code scanner according to any preceding claim, wherein the separation of the openings of the slit (19) is in the range 0.05 to 0.1 mm.

13. A bar code scanner according to claim 12, wherein the separation of the
20 openings of the slit (19) is 0.075mm.

14. A sheet validator including a sheet path (6) along which a sheet (31) to be validated is passed and a bar code scanner (12), according to any preceding claim, located for scanning a bar code (32) on a sheet (31) passing along the sheet path (6).

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15. A method of manufacturing a bar code scanner comprising forming a light transmissive slit (19) in a metallic element (18) and mounting the element (18) with respect to a light source means (15) and a light detector means (16), such light from the light source means (15) can pass through the slit (19) and light from the light
30 source means (15) that is reflected back through the slit (19) can be detected by the light detector means (16).

16. A method according to claim 15, wherein the slit (19) is formed by chemically etching a thin metallic element (18).

5 17. A method of manufacturing a sheet validator including a bar code scanner (12), the method including a method according to claim 15 or 16 for manufacturing said bar code scanner (12).

18. A bar code scanner comprising:
a metallic element having a light transmissive slit therein,
10 light source means for directing a beam through said slit, and
light detector means for detecting light from said beam reflected back through the slit,
wherein the slit is arranged for being brought into proximity to a bar code for scanning thereof.

15 19. A bar code scanner according to claim 18, wherein the light source means is configured for directing said beam through the slit such that the beam path through the slit lies in a plane substantially aligned with the slit.

20 20. A bar code scanner according to claim 19, where in the light source means is configured to direct light obliquely through the slit.

21. A bar code scanner according to claim 18, wherein the light detector means is configured for sensing reflections of said beam following a path through the slit
25 that lies in a plane substantially aligned with the slit.

22. A bar code scanner according to claim 21, wherein the light detector means is directional and arranged such that it is directed along a line substantially normal to the slit.

30 23. A bar code scanner according to claim 18, wherein the light source is an infrared LED.

24. A bar code scanner according to claim 18, wherein the metallic element is formed from a stainless steel.

25. A bar code scanner according claim 18, including a panel by which a sheet
5 can be passed, the panel having an aperture through which the slit is exposed.

26. A bar code scanner according to claim 25, including a member having a
dished portion, wherein the slit is formed in an opaque element which is
accommodated in said dished portion and the dished portion is received in said
10 aperture.

27. A bar code scanner according to claim 18, wherein the width of the slit is in
the range 0.2mm to 0.4mm.

28. A bar code scanner according to claim 27, wherein the width of the slit is
15 0.3mm.

29. A bar code scanner according to claim 18, wherein the separation of the
openings of the slit is in the range 0.05 to 0.1 mm.

30. A bar code scanner according to claim 29, wherein the separation of the
openings of the slit is 0.075mm.

31. A bar code scanner comprising:

25 a metallic element having a slit therein,

a light source means for directing light obliquely through said slit in a plane
normal to and aligned with said slit, and

a light detector means for receiving light passing through the slit along a
path normal thereto,

30 wherein the light source means and the light detector means are on the same
side of said element.

32. A sheet validator including a sheet path along which a sheet to be validated is passed and a bar code scanner comprising:

a metallic element having a light transmissive slit therein,

light source means for directing a beam through said slit, and

5 light detector means for detecting light from said beam reflected back through the slit,

wherein the slit is arranged for being brought into proximity to a bar code for scanning thereof.

10 33. A sheet validator according to claim 32, wherein the light source means is configured for directing said beam through the slit such that the beam path through the slit lies in a plane substantially aligned with the slit.

34. A sheet validator according to claim 33, where in the light source means is
15 configured to direct light obliquely through the slit.

35. A sheet validator according to claim 32, wherein the light detector means is configured for sensing reflections of said beam following a path through the slit that lies in a plane substantially aligned with the slit.

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36. A sheet validator according to claim 35, wherein the light detector means is directional and arranged such that it is directed along a line substantially normal to the slit.

25 37. A sheet validator according to claim 32, wherein the light source is an infrared LED.

38. A sheet validator according to claim 32, wherein the metallic element is formed from a stainless steel.

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39. A sheet validator according claim 32, including a panel by which a sheet can be passed, the panel having an aperture through which the slit is exposed.

40. A sheet validator according to claim 39, including a member having a dished portion, wherein the slit is formed in an opaque element which is accommodated in said dished portion and the dished portion is received in said aperture.

5 41. A sheet validator according to claim 32, wherein the width of the slit is in the range 0.2mm to 0.4mm.

42. A sheet validator according to claim 41, wherein the width of the slit is 0.3mm.

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43. A sheet validator according to claim 32, wherein the separation of the openings of the slit is in the range 0.05 to 0.1 mm.

15 44. A sheet validator according to claim 43, wherein the separation of the openings of the slit is 0.075mm.

45. A sheet validator including a sheet path along which a sheet to be validated is passed and a bar code scanner comprising:

20 a metallic element having a slit therein,
a light source means for directing light obliquely through said slit in a plane normal to and aligned with said slit, and
a light detector means for receiving light passing through the slit along a path normal thereto,

25 wherein the light source means and the light detector means are on the same side of said member.

46. A method of manufacturing a bar code scanner comprising forming a light transmissive slit in a metallic element and mounting the metallic element with respect to a light source means and a light detector means, such light from the light
30 source can pass through the slit and light from the light source that is reflected back through the slit can be detected by the light detector means.

47. A method according to claim 46, wherein the slit is formed by chemically etching a thin metallic element.

5 48. A method of manufacturing a sheet validator including a bar code scanner, the method including a method according to claim 46 for manufacturing said bar code scanner.

10 49. A method of manufacturing a sheet validator including a bar code scanner, the method including a method according to claim 47 for manufacturing said bar code scanner.